Data Structures Full Syllabus

Data Structure Kya Hota Hai?

Data Structure ek aisa tareeka hai jisme data ko efficiently store, organize aur manage kiya jata hai taki uspar jaldi se operations (insert, delete, update, search, etc.) kiye ja saken.

Goal: Time aur Space dono ko optimize karna.

Data Structure ke Main Types

1. Primitive Data Structures: int, float, char, boolean, pointers.
2. Non-Primitive Data Structures:
   a. Linear: Array, Linked List, Stack, Queue
   b. Non-Linear: Tree, Graph

Linear Data Structures

1. Array: Fixed size, indexed.
2. Linked List: Nodes with data & pointer.
3. Stack: LIFO, Push/Pop.
4. Queue: FIFO, Enqueue/Dequeue.
   Types: Circular, Priority, Deque

Non-Linear Data Structures

1. Tree: Hierarchical structure.
   Types: Binary Tree, BST, AVL, Heap, Trie
2. Graph: Nodes & Edges.
   Types: Directed, Undirected, Weighted
   Algorithms: DFS, BFS, Dijkstra, Kruskal, Prim

Hashing

Hash Table and Hash Map

Collision Handling: Chaining, Open Addressing

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Operations on Data Structures

Insert, Delete, Traverse, Search, Sort, Update

Sorting Algorithms

Bubble, Selection, Insertion, Merge, Quick, Heap, Counting, Radix, Bucket Sort

Searching Algorithms

Linear Search, Binary Search, Ternary, Jump, Exponential, Interpolation

Advanced Data Structures

Segment Tree, Fenwick Tree, Disjoint Set, Sparse Table, K-D Tree

Interview ke liye Important Topics

Arrays, Linked List, Stack-Queue problems

Tree traversals, Graph algorithms (DFS/BFS)

Quick Sort, Merge Sort

Dynamic Programming

Time/Space Complexity Analysis

Complexity Analysis

Big O Notation: O(1), O(n), O(log n), O(n^2)

Best, Worst, Average Cases

Recurrence Relations